

## PRELIMINARY AMENDMENT

PAGE 7

Serial No.: 10/002,574

Filing Date: 11/14/2001

Attorney Docket No. 10003836-1

Title: ILLUMINATION SYSTEM FOR ILLUMINATING A SCAN REGION ON AN OBJECTREMARKS

The Final Office Action mailed on April 30, 2007 has been reviewed, along with the art cited. Claims 1-20 are pending in this application.

Rejections Under 35 U.S.C. § 103

Claims 1-20 were rejected under 35 USC § 103(a) as being unpatentable over Zou et al. (U.S. Patent No. 6,186,649). Applicant respectfully traverses this rejection.

Claim 1 reads as follows:

An illumination system for illuminating a scan region on an object, comprising:

a hollow reflector having an interior reflective surface and an exit aperture;

a light source positioned within said hollow reflector, said light source producing a plurality of light rays, some of the light rays produced by said light source being reflected by the interior reflective surface of said hollow reflector before passing through the exit aperture;

a first reflector disposed on a first side of the exit aperture of said hollow reflector; and

a second reflector disposed on a second side of the exit aperture of said hollow reflector, said first and second reflectors being positioned in non-parallel, spaced-apart relation to one another, said first and second reflectors at least partially collimating light passing through the exit aperture of said hollow reflector to form a collimated beam.

Zou does not teach or suggest an illumination source that includes "a hollow reflector having . . . an exit aperture" with "a first reflector disposed on a first side of the exit aperture" and "a second reflector disposed on a second side of the exit aperture" in a manner to "at least partially collimat[c] light passing through the exit aperture." The Examiner points to sidewalls 420 and 422 of external optical element 416 of Zou to meet this limitation. However, sidewalls 420 and 422 are part of optical element 416 and are external to reflective enclosure 404. Thus, sidewalls 420 and 422 are not "disposed on" the first and second sides of the exit aperture.

Further, one of ordinary skill in the art, using ordinary creativity, would not find it obvious, based on Zou, to dispose reflectors on the sides of the exit aperture of the

**PRELIMINARY AMENDMENT****PAGE 8**

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reflective enclosure 404. First, as seen in Figure 12 of Zou, the thickness of the exit aperture in reflective enclosure 404 of Zou is substantially smaller than the width 432 of the sidewalls 420 and 422 of the external optical element 416. Thus, it would not be apparent to one of ordinary skill in the art that disposing these reflective surfaces on the sides of the exit aperture would provide any beneficial collimation beyond that achieved by the existing exit aperture of the reflective enclosure 404 of Zou. Further, as discussed with respect to Figures 10 and 11, one of ordinary skill in the art would be lead to believe from Zou that the size of the aperture of reflective enclosure 404 itself can be controlled to provide "higher output irradiance and radiance." Col. 10, lines 5-20. Therefore, one of ordinary skill in the art would not find it obvious to add reflective surfaces to the sides of the exit aperture of the hollow reflector as claimed. Withdrawal of the rejection is respectfully requested.

Claims 2 to 9 depend directly or indirectly from claim 1 and are allowable at least for the reasons identified above with respect to claim 1. Withdrawal of the rejection is respectfully requested.

Claim 10 reads as follows:

An illumination system for illuminating a scan region on an object, comprising:

- a body having an interior wall defining a generally cylindrically shaped interior reflective surface, the interior wall of said body also defining a generally elongate axial opening therein located at a first radial position on the interior wall of said body;

- a light source positioned within the generally cylindrically shaped interior reflective surface defined by said body;

- a first reflector disposed on a first side of the elongate axial opening defined by the interior wall of said body;

- a second reflector disposed on a second side of the elongate axial opening defined by the interior wall of said body, said first and second reflectors being positioned in non-parallel, spaced-apart relation to one another, said first and second reflectors at least partially collimating light passing through the exit aperture of said hollow reflector to form a collimated beam; and

**PRELIMINARY AMENDMENT****PAGE 9**

Serial No.: 10/002,574

Filing Date: 11/14/2001

Attorney Docket No. 10003836-1

Title: ILLUMINATION SYSTEM FOR ILLUMINATING A SCAN REGION ON AN OBJECT

wherein the first and second reflectors form a sharp corner at a junction with the interior reflective surface of the body.

Zou does not teach or suggest an illumination system with "a body having an . . . interior reflective surface . . . [and] a generally elongate axial opening" with "a first reflector disposed on a first side of the elongate axial opening" and "a second reflector disposed on a second side of the elongate axial opening" and "first and second reflectors form a sharp corner at a junction with the interior reflective surface of the body." As discussed above, Zou does not teach or suggest disposing reflectors on the sides of an opening in a body of an illumination system. Further, there is no teaching in Zou concerning forming a sharp corner between the reflectors and the interior surface of the hollow reflector. Therefore, it would not have been obvious to one of ordinary skill in the art to include first and second reflectors in the exit aperture of Zou in the manner called for in claim 10. Withdrawal of the rejection is respectfully requested.

Claims 11-17 depend directly or indirectly from claim 10 and are allowable at least for the reasons identified with respect to claim 10. Withdrawal of the rejection is respectfully requested.

Claim 18 reads as follows:

An illumination system for illuminating a scan region on an object, comprising:

hollow reflector means for defining an interior reflecting surface and an exit aperture;

light source means positioned within said hollow reflector means for producing a plurality of light rays;

collimating reflector means disposed on the exit aperture defined by said hollow reflector means for at least partially collimating light exiting the exit aperture defined by said hollow reflector means to form a collimated beam; and

rounded transition means provided between the interior reflecting surface of the hollow reflector means and the collimating reflector means for providing a diffusing reflective surface.

Zou does not teach or suggest an illumination system with "hollow reflector means for defining an interior reflecting surface and an exit aperture," "collimating

**PRELIMINARY AMENDMENT****PAGE 10**

Serial No.: 10/002,574

Filing Date: 11/14/2001

Attorney Docket No. 10003836-1

Title: ILLUMINATION SYSTEM FOR ILLUMINATING A SCAN REGION ON AN OBJECT

reflector means disposed on the exit aperture” and “rounded transition means provided between the interior reflecting surface of the hollow reflector means and the collimating reflector means for providing a diffusing reflective surface.” Zou does not teach or suggest “collimating reflector means disposed on the exit aperture.” Further, Zou does not teach or suggest “rounded transition means provided between the interior reflecting surface of the hollow reflector means and the collimating reflector means for providing a diffusing reflective surface.” At least for these reasons, claim 18 is not obvious in view of Zou. Withdrawal of the rejection is respectfully requested.

Claim 19 depends from claim 18 and is allowable at least for the reasons identified above with respect to claim 18. Withdrawal of the rejection is respectfully requested.

Claim 20 reads as follows:

A method for illuminating a scan region on an object, comprising:  
providing a hollow reflector having an interior reflecting surface  
and an exit aperture;

disposing a collimating reflector on at least one surface of the exit  
aperture of the hollow reflector and forming a junction between the  
collimating reflector and the interior reflecting surface; and

directing a plurality of light rays onto the interior reflecting surface  
of the hollow reflector, the interior reflecting surface reflecting some of  
the light rays through the exit aperture in the hollow reflector, the  
collimating reflector at least partially collimating light exiting the exit  
aperture in the hollow reflector to form a collimated beam.

Zou does not teach or suggest a method of illuminating a scan region that includes “disposing a collimating reflector on at least one surface of the exit aperture of the hollow reflector and forming a junction between the collimating reflector and the interior reflecting surface.” Therefore, claim 20 is not obvious in light of Zou. Withdrawal of the rejection is respectfully requested.

**PRELIMINARY AMENDMENT****PAGE 11**

Serial No.: 10/002,574

Filing Date: 11/14/2001

Attorney Docket No. 10003836-1

Title: ILLUMINATION SYSTEM FOR ILLUMINATING A SCAN REGION ON AN OBJECT**CONCLUSION**

Applicant respectfully submits that claims 1-20 are in condition for allowance and notification to that effect is earnestly requested. If necessary, please charge any additional fees or credit overpayments to Deposit Account No. 08-2025.

Respectfully submitted,

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